

Top Secret



DIRECTORATE OF
INTELLIGENCE

Industrial Facilities
(Non-Military)

Basic Imagery Interpretation Report

Moskva Petroleum Refinery Lyubertsy

Lyubertsy, USSR



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CENTRAL INTELLIGENCE AGENCY
 Directorate of Intelligence
 Imagery Analysis Service

INSTALLATION OR ACTIVITY NAME

COUNTRY

Moskva Petroleum Refinery Lyubertsy

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UTM COORDINATES 37VDC688242	GEOGRAPHIC COORDINATES 55-39-00N 037-48-24E	COMIREX NO. None	NIETB NO. None
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MAP REFERENCE

8th RTS. USATC, Series 200 Sheet M0167-5H1 3rd ed Jul 67 Scale 1:200,000
 (SECRET)

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LATEST IMAGERY USED

NEGATION DATE (If required)

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NA

ABSTRACT

Moskva Petroleum Refinery Lyubertsy is a small, older Soviet refinery. Its main products are straight-run, cracked, reformed, and blended gasolines, desulfurized diesel and fuel oils, sulfur, asphaltic materials, and various gaseous hydrocarbons. It also contains two probable pilot plants for research and development.

The major production facilities include one and probably two crude oil distillation units, a thermal cracking unit, a fractionation unit, a catalytic reforming-hydrotreating unit, two probable catalytic reforming units, a probable hydrotreating unit, four gas processing units, an elemental sulfur recovery unit, blending and treating facilities, and several unidentified processing units.

The refinery appeared to be operating in March 1962, the date of the earliest photography used in this report. It was operating in September 1963, when it was first seen on good-quality photography, and on all subsequent coverages except that of June 1964. Construction has been observed on all photography since September 1963. One area was under construction on the latest coverage in June 1971.

This report includes a line drawing, a photograph of the refinery, a listing of facilities with measurements of storage tanks, a chart showing construction chronology, and a discussion of the status of facilities.

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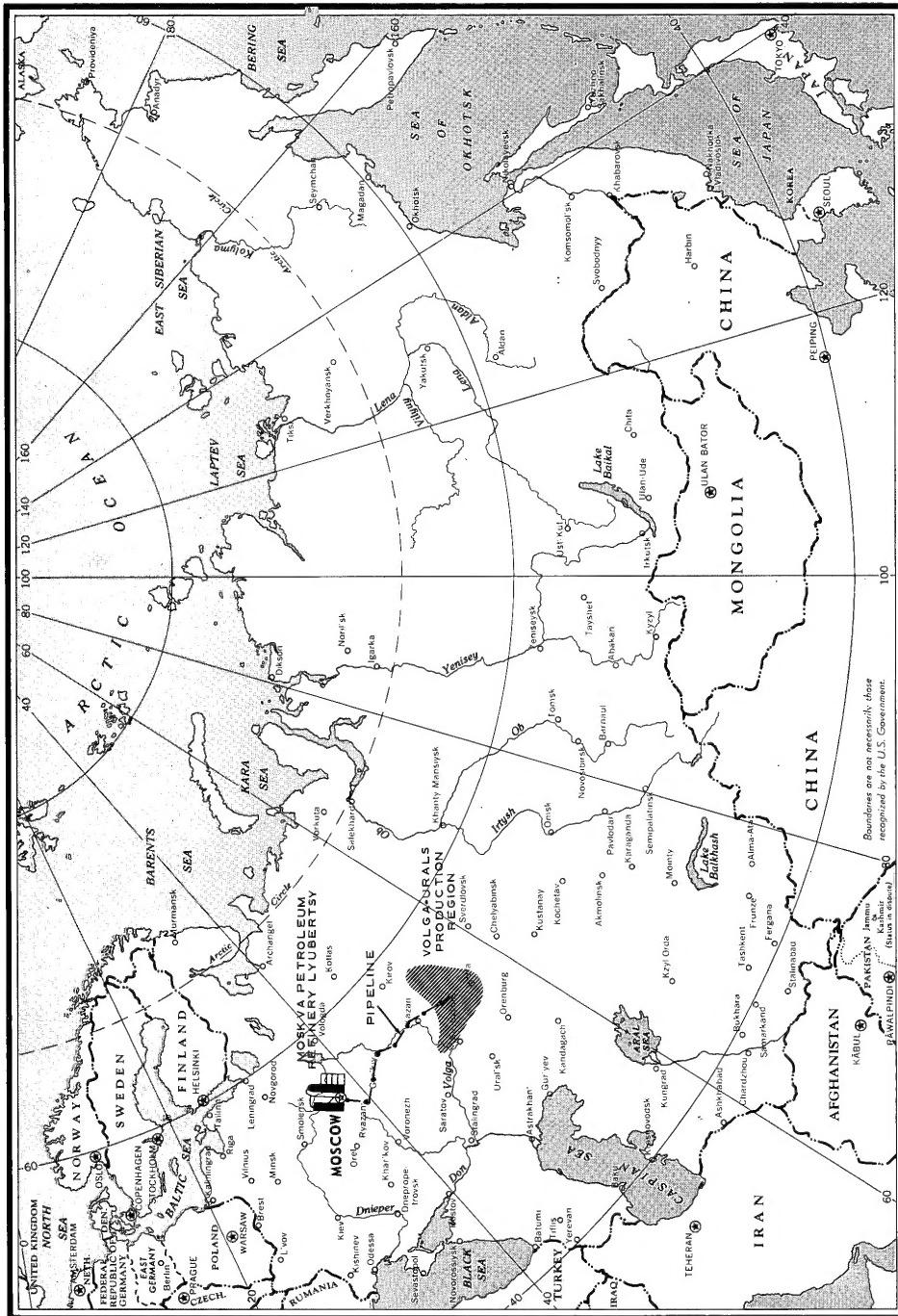


FIGURE 1. LOCATION MAP.

Boundaries are not necessarily those recognized by the U.S. Government.

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25X1**INTRODUCTION**

The Moskva Petroleum Refinery Lyubertsy is located in Lyubertsy, a south-eastern suburb of Moscow (see Figure 1). It has reportedly been operating for over 34 years. 1/

The refinery is used for research and development as well as fuels production. Soviet reports indicate that the following research and design institutes have been associated with the refinery: the All-Union Scientific Research Institute for Petrochemical Processing, the Leningrad State Institute for Designing Enterprises for Synthetic Liquid Fuel and Gas, the State Scientific Research and Design Institute for Petroleum Machine-Building, and the Institute of Chemical Physics. Research at the refinery has included studies of atmospheric-vacuum distillation, catalytic reforming, furnace construction, polypropylene production, carbamide deparaffination, and acetic acid production. 1/

Crude oil to charge the refinery comes via pipeline from the Volga-Urals production region. 2/

Electric power and possibly some steam for the refinery are produced at the adjacent Moskva Heat and Thermal Power Plant Lyubertsy TETS [redacted]

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BASIC DESCRIPTIONPhysical Features

The refinery measures approximately 6,600 by 5,700 feet and occupies about 875 acres (see Figures 2 and 3). It is secured by a wall. Rail service into the refinery is provided by a spur from the main line between Moscow and Voskresensk.

Operational Functions

The major refinery units presently in operation include one and probably two crude oil distillation units, a thermal cracking unit, a fractionation unit, a catalytic reforming-hydrotreating unit, two probable catalytic reforming units, and a probable hydrotreating unit. It also contains a gas fractionation unit, a gas separation unit and two other gas processing units, an elemental sulfur recovery unit, blending and treating facilities, and several unidentified processing units. In addition, the refinery contains two probable pilot plants.

This refinery appears to have a smaller crude oil distillation capacity than most other major Soviet refineries, and a larger secondary processing capability than would ordinarily be required to further refine this crude. Some of the secondary processing units may be used for research and development, based on the fact that no two units are of the same design and on the presence of the two probable pilot plants. It is also possible that some of the secondary units are not utilized to their full capacity, or that they use oil previously processed at other refineries.

Construction and Operational Status

Construction has been observed on all coverage since September 1963, when the refinery was first seen on good-quality photography. Figure 4 shows the construction chronology of the individual units. Most of the major units in the refinery were complete by late 1964. On the latest coverage in June 1971, one area was still under construction.

The refinery appeared to be operating on poor-quality coverage of March 1962. It was operating on photography of September 1963 and on all subsequent coverage except that of June 1964.

Facilities and Equipment

Table 1 lists the functional areas, facilities, and equipment within the refinery. Measurements are given to the nearest half-meter.

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AREA	FUNCTIONAL DESCRIPTION	1963	1964	1965	1966	1967	1968	1969	1970	1971
1	WATER COOLING AND TREATMENT									
2	U/I SECONDARY PROCESSING									
3	GAS SEPARATION									
4	WASTE GAS DISPOSAL									
5	PROBABLE CRUDE OIL DISTILLATION									
6	BLENDING, TREATING, AND SHIPPING									
7	CRUDE OIL DISTILLATION									
8	THEMAL CRACKING									
9	U/I SECONDARY PROCESSING									
10	STORAGE									
11	PROBABLE STEAM PLANT									
12	U/I SECONDARY PROCESSING									
13	PRODUCTS STORAGE									
14	PROBABLE PILOT PLANT									
15	U/I SECONDARY PROCESSING									
16a	U/I SECONDARY PROCESSING									
16b	ELEMENTAL SULFUR RECOVERY									
17a	U/I SECONDARY PROCESSING									
17b	DESALTING									
17b	DESALTING									
18	SHIPPING, PACKAGING AND SUPPORT									
19	FRACTIONATION									
20	GAS FRACTIONATION									
21	U/I SECONDARY PROCESSING									
22	WATER TREATMENT AND PRODUCTS STORAGE									
23	STORAGE									
24	U/I SECONDARY PROCESSING									
25a	CATALYTIC REFORMING-HYDROTREATING									
25b	PROBABLE CATALYTIC REFORMING									
	GAS PROCESSING									
25c	PROBABLE HYDROTREATING									
25d	U/I CONSTRUCTION									
26	PROBABLE CATALYTIC REFORMING									
27	PROBABLE PILOT PLANT									
28	SHIPPING									
29	STORAGE AND SUPPORT									
30	GAS PROCESSING									
	STEAM PLANT									

LEGEND

■	UNDER CONSTRUCTION
■	COMPLETE
■	EXPANSION

FIGURE 4. CONSTRUCTION CHRONOLOGY, MOSKVA PETROLEUM REFINERY LYUBERTSY, USSR.

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Table 1. Equipment and Facilities at Moskva Petroleum Refinery Lyubertsy
 (Keyed to Figure 3)

<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>
1	Water Cooling and Treatment	12 Pump buildings 3 Water treatment buildings 18 Support buildings 1 Venturi cooling tower 10 Induced-draft cooling towers 1 with 6 cells 1 with 5 cells 7 with 3 cells each 1 with 2 cells 4 Cylindrical storage tanks, 9 meters in diameter 15 Water treatment basins 1 Waste water holding lagoon 2 Water basins under construction
2	Unidentified Secondary Processing	1 Unit with 7 columns 2 processing buildings 5 pump buildings 6 support buildings 4 horizontal storage tanks/ accumulators (not measured) 2 Gasholders 1 16.5-meter-diameter 1 9-meter-diameter
3	Gas Separation	1 Unit with 10 columns 2 banks of processing equipment 1 processing building 1 processing/pump building 4 pump buildings 5 support buildings 15 horizontal storage tanks, 15 meters long 2 gasholders, 9 meters in diameter
4	Waste Gas Disposal	5 Support buildings 2 Flare towers
5	Probable Crude Oil Distillation	1 Unit with 1 probable atmospheric column 10 other columns 1 bank of heat exchangers/cooling coils/accumulators 2 pipe furnaces 2 pump buildings 4 support buildings
6	Blending, Treating, and Shipping	18 Blending/treating tanks 1 Blending/treating building 2 Pump buildings 2 Shipping buildings 4 Support buildings 1 Cylindrical storage tank, 9 meters in diameter 1 Water basin

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>	
7	Crude Oil Distillation	<p>1 Unit with</p> <ul style="list-style-type: none"> 2 atmospheric columns 1 vacuum column 5 other columns 1 bank of processing equipment 2 banks of heat exchangers/cooling coils/accumulators 3 pipe furnaces 2 pump buildings 1 support building 2 cylindrical storage tanks, <p>3 horizontal storage tanks (not measured)</p> <p>3 Support buildings</p>	25X1
8	Thermal Cracking	<p>1 Unit with</p> <ul style="list-style-type: none"> 2 reactor columns 1 fractionating column 1 flash column 20 other columns (some probably are used for vapor recovery) 1 bank of processing equipment 3 pipe furnaces 4 processing/pump buildings 6 pump buildings 6 other buildings 4 cylindrical storage tanks, <p>5 horizontal storage tanks (not measured)</p>	25X1
9	Unidentified Secondary Processing	<p>1 Unit with</p> <ul style="list-style-type: none"> 2 columns 1 pipe furnace 1 processing building 2 pump buildings 1 support building <p>3 Support buildings</p> <p>10 Cylindrical storage tanks</p> <ul style="list-style-type: none"> 4 15-meter-diameter 4 12-meter-diameter 2 9-meter-diameter 	
10	Storage	<p>3 Pump buildings</p> <p>6 Support buildings</p> <p>17 Cylindrical storage tanks</p> <ul style="list-style-type: none"> 3 24-meter-diameter 1 18-meter-diameter 3 [redacted] 10 15-meter-diameter 	25X1
11	Probable Steam Plant	<p>1 Probable steam generating building</p> <p>4 Support buildings</p> <p>4 Cylindrical storage tanks,</p>	25X1

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>
12	Unidentified Secondary Processing	<p>1 Unit with 5 columns 2 banks of processing equipment (one is very tall and probably encloses some columns) 1 pump/processing building 3 pump buildings</p> <p>2 Support buildings</p> <p>2 Cooling towers 1 with 5 cells 1 with 3 cells</p> <p>1 Water treatment basin</p>
13	Products Storage	<p>4 Support buildings</p> <p>21 Cylindrical storage tanks 5 6-meter-diameter</p>
14	Probable Pilot Plant	<p>16 [] 25X1</p> <p>9 Columns 1 Bank of heat exchangers/cooling coils/accumulators 6 Processing buildings (one circular shaped) 3 Pump buildings 2 Support buildings 4 Cylindrical storage tanks (not measured) 12 Horizontal storage tanks (not measured)</p>
15	Unidentified Secondary Processing	<p>1 Unit with 12 columns 1 bank of processing equipment 1 bank of heat exchangers/ cooling coils/accumulators 5 horizontal reactors/settlers/ accumulators 8 horizontal accumulators/ settling tanks 2 processing buildings 3 pump buildings 1 support building 2 cylindrical storage tanks, 6 meters in diameter 4 horizontal tanks, 9 meters long 4 Pump buildings 2 Support buildings</p> <p>12 Cylindrical storage tanks 3 15-meter-diameter 9 9-meter-diameter</p> <p>4 Horizontal storage tanks 2 24-meter-long 2 15-meter-long</p> <p>1 Water basin</p>
16	Unidentified Secondary Processing and Elemental Sulfur Recovery (a) Unidentified Secondary Processing	<p>1 Unit with 6 columns 3 accumulators/settling tanks 2 pump buildings</p>

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>	
16 (cont)		3 cylindrical storage tanks 1 6-meter-diameter 2 [redacted] 3 Cylindrical storage tanks, 9 meters in diameter	25X1
	(b) Elemental Sulfur Recovery	1 Unit with 3 columns 2 reaction-type vessels 2 possible retorts 1 bank of processing equipment 1 pump building 1 support building 1 cylindrical storage tank (not measured) 1 open storage area for sulfur	
17	Unidentified Secondary Processing and Desalting (a) Unidentified Secondary Processing	1 Unit with 10 columns 2 banks of processing equipment 1 bank of heat exchangers/ cooling coils/accumulators 1 pipe furnace 3 processing buildings 4 pump buildings 7 cylindrical storage tanks 2 9-meter-diameter 5 [redacted] 5 horizontal storage tanks 4 9-meter-long 1 6-meter-long	25X1
	(b) Desalting	1 Unit with 2 desalting spheres 5 settling tanks 1 processing building 1 Unit with 3 desalting spheres 4 settling tanks 3 processing buildings 5 Support buildings	
18	Shipping, Packaging, and Support	2 Packaging buildings 5 Shipping buildings 12 Support buildings	
19	Fractionation	1 Unit with 2 fractionating columns 1 bank of processing equipment 1 pipe furnace 1 processing building 6 Cylindrical storage tanks 2 15-meter-diameter 4 9-meter-diameter	
20	Gas Fractionation	1 Unit with 3 gas fractionating columns 3 other columns 2 banks of processing equipment 2 pump buildings 1 support building 4 cylindrical tanks (not measured)	

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>	
20 (cont)		24 horizontal storage tanks 22 [redacted] 15-meter-long 2 [redacted] gasholder, [redacted] in diameter	25X1
21	Unidentified Secondary Processing	1 Unit with 4 banks of processing equipment 3 processing buildings 1 pump building 4 horizontal tanks (not measured) 2 Pump buildings 3 Cylindrical storage tanks, [redacted]	25X1
		16 Horizontal storage tanks 3 [redacted] 15-meter-long 7 [redacted] 2 9-meter-long 4 6-meter-long	25X1
22	Water Treatment and Products Storage	5 Pump buildings 14 Support buildings 20 Cylindrical storage tanks 1 [redacted] 6 [redacted] 1 12-meter-diameter 1 9-meter-diameter 3 [redacted] 6 6-meter-diameter 2 [redacted]	25X1
		4 Spherical storage tanks, [redacted]	25X1
23	Storage	5 Pump buildings 1 Support building 74 Cylindrical storage tanks 4 45-meter-diameter 1 36-meter-diameter 1 30-meter-diameter 46 24-meter-diameter 1 21-meter-diameter 8 [redacted] 3 [redacted] 2 12-meter-diameter 1 [redacted] 7 [redacted]	25X1
		2 Water basins	25X1
24	Unidentified Secondary Processing	1 Unidentified secondary processing unit with 4 columns 1 bank of processing equipment 1 pipe furnace 1 processing building 2 pump buildings 26 Horizontal storage tanks 25 15-meter-long 1 [redacted]	25X1

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>
25	Catalytic Reforming and Hydrotreating	1 Unit with 4 reactors 8 columns 2 banks of processing equipment 2 banks of heat exchangers/ cooling coils 3 pipe furnaces 3 pump buildings 4 support buildings
	(a) Catalytic Reforming- Hydrotreating	1 Pump building
	(b) Probable Catalytic Reforming and Gas Processing	1 Probable catalytic reforming unit with 9 columns 3 banks of processing equipment 1 bank of heat exchangers/cooling coils/accumulators 1 pipe furnace 2 processing buildings (one with 4 attached accumulators/settling tanks) 3 pump buildings
		1 Gas processing unit with 5 columns 1 bank of processing equipment 1 pump building 1 gasholder, 18 meters in diameter
	(c) Probable Hydrotreating	1 Unit with 1 column 1 bank of heat exchangers/ cooling coils/accumulators 1 pipe furnace 1 pump building 1 Support building 1 Area under construction
	(d) Probable Catalytic Reforming	1 Unit with 8 columns 4 banks of processing equipment (2 banks probably contain two reactors each) 3 banks of heat exchangers/ cooling coils/accumulators 7 horizontal accumulators/ settling tanks 4 pipe furnaces 1 processing building with 4 attached accumulators/ settling tanks 2 pump buildings 1 cylindrical storage tank (not measured) 1 Support building

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment and Facilities</u>	
26	Probable Pilot Plant	1 Unit with 5 columns 3 banks of processing equipment 1 pipe furnace 1 processing building 1 pump building 1 support building 8 Support buildings 1 Cooling tower 6 Cylindrical storage tanks 2 7.5-meter-diameter 4 6-meter-diameter	
.27	Shipping	2 Pump buildings 1 Shipping building 1 Loading rack	
28	Storage and Support	4 Pump buildings 6 Support buildings 22 Cylindrical storage tanks 5 [redacted] 12 [redacted] 2 9-meter-diameter 3 [redacted]	25X1
29	Gas Processing	1 Unit with 2 columns 1 compressor building 1 support building 1 gasholder, 21 meters in diameter	25X1
30	Steam Plant	1 Steam generator building 3 Cylindrical storage tanks, [redacted]	25X1

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Map

8th RTS. US Air Target Chart, Series 200, Sheet M0167-5HL, 3rd edition,
July 1967, Scale 1:200,000 (SECRET)

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Documents

1. US Department of Commerce. JPRS, 44605, Studies in Oil Refining and Petrochemistry, USSR, "Development of Moscow Oil Refinery," D.V. Ivanyukov, pp 47-46, 7 March 1968 (UNCLASSIFIED)
2. CIA. CRS/IR File No. 7012178, FBIS 63 L467, January 1963 (UNCLASSIFIED)
3. The Petroleum Publishing Co., International Petroleum Encyclopedia, 1969 edition (UNCLASSIFIED)

Requirement

COMIREX N06
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